ALASKA FEDERAL OFFSHORE
Descriptions of Geologic Plays
1995 National Resource Assessment
U.S. Minerals Management Service

ST. GEORGE BASIN ASSESSMENT PROVINCE
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Four plays with geophysically-mapped prospects have been identified in the St. George basin assessment province: (1) the St. George graben, (2) the south platform, (3) the north platform, and (4) the Pribilof basin.

Play 1 (UASG0101[1]): St. George Graben: The St. George graben trends northwest-southeast for over 200 miles, is 10- to 25-miles wide, and contains as much as 40,000 feet of Cenozoic strata (Marlow and others, 1976). Potential hydrocarbon traps include faulted anticlines, upthrown fault traps along the border faults of the graben, drape of Tertiary strata over basement fault blocks, stratigraphic onlap onto the basement, and possible pinchout of sands. Five exploratory wells, including one sidetrack hole, were drilled in the graben. All wells were plugged and abandoned with only minor gas shows encountered.

The best reservoir rocks encountered in the graben are Oligocene sandstones. The Arco Y-0511 well encountered fine-grained Oligocene sandstones in beds ranging from 10- to 40-feet thick for a gross total of 460 feet. Porosities ranged from 20 to 30 percent and permeabilities ranged from 20 to 130 millidarcies. The Exxon Y-0527 well had Oligocene sandstones in beds ranging from 5- to 20-feet thick for a gross total of 185 feet. The Exxon Y-0530 and the Chevron Y-0519 wells, also located in the graben, had no sandstones of reservoir quality. Porosity loss with depth tends to be very high in the St. George basin province because the rocks have a high content of volcanic rock fragments which are diagenetically altered to zeolite and clay minerals with burial.

The source-rock potential is poorly known for the graben, but the COST No. 2 well, located along its southeastern margin, had relatively low TOC values in the Cenozoic and Mesozoic sections (Turner and others, 1984b). The kerogen types identified were gas-prone and the top of the oil window occurs at approximately 12,000 feet. Other unexplored areas of the graben are much deeper and may have better source-rock potential. The Arco Y-0511 well penetrated the northern boundary fault of the graben and recovered samples of Jurassic shales that had TOC values of 0.5 to 2.0 percent. The visual kerogen examination reported a high

[1]*The "UA" Code is the "Unique Assessment Identifier" for each play, and is the principal guide to GRASP data files.*

percentage of amorphous material. If oil-prone source rocks are present in the St. George basin province, they probably occur in Jurassic strata. The province is underlain by the Mesozoic Peninsular terrane which extends from the Cook Inlet area, where Middle Jurassic strata are known to have generated oil (Magoon and Claypool, 1981; Magoon and Anders, 1992).

Play 2 (UASG0201). South Platform Play The south platform includes the area south of the St. George graben to the continental slope and east of Pribilof Canyon. This stable shelf area contains as much as 10,000 feet of nearly flat-lying strata, separated from acoustic basement by an angular unconformity. The overlying strata range from middle Eocene to Pleistocene and were mostly deposited in a marine-shelf environment. The basement at the COST No. 1 well consists of basaltic igneous rocks, but Mesozoic and lower Tertiary sedimentary rocks occur below the acoustic basement unconformity elsewhere. Potential traps include anticlinal structures within the acoustic basement, drape of Tertiary sands over basement highs, fault-bounded traps, and stratigraphic onlap onto basement highs. Five exploratory wells and one COST well were drilled in the south platform play area, all of which were plugged and abandoned with only minor gas shows encountered.

The best reservoir-rock potential is in the Oligocene section. The COST No. 1 well contained individual sandstone beds greater than 150 feet thick, with an aggregate total of 1,200 feet. Porosities were as high as 25 percent and permeabilities were as high as 37 millidarcies (Turner and others, 1984a). Permeabilities were as high as 300 to 400 millidarcies in Oligocene sandstones in the Shell Y-0454 well.

Source-rock potential in the south platform area appears to be poor. The sediments were deposited under oxidizing conditions and are low in TOC. Only gas-prone kerogen types were present in samples from the COST No. 1 well, and the rocks were thermally immature. The oil window occurs at approximately 12,000 feet, so any hypothesized thermally mature hydrocarbon source must involve rocks that lie below the acoustic basement unconformity, the latter generally shallower than 10,000 feet in this play area.

Play 3 (UASG0301). North Platform Play : The north platform extends north of the St. George graben for about 10 to 25 miles. This area contains 3,000 to 10,000 feet of Cenozoic sedimentary rocks over the acoustic basement unconformity. The basement just north of the graben is probably composed of Mesozoic and lower Tertiary sedimentary rocks. Farther north, less than 3,000 feet of Cenozoic strata occur over igneous basement. Potential traps include stratigraphic onlap onto basement highs, anticlinal structures within the basement, drape of Tertiary strata over basement highs, and fault-bounded traps. No exploratory wells have tested prospects in the north platform play.

Oligocene sandstones probably have the best reservoir-rock potential, based on seismic correlation from well control in the graben to the south. The oil window occurs at approximately 12,000 feet, so thermally mature source rocks would have to be present in basement strata for the north platform play to be viable. The best source-rock potential is probably in Jurassic strata, based on data from the Arco Y-0511 well, which was drilled in the graben but penetrated the north-bounding fault.

Play 4 (UASG0401). Pribilof Basin Play : The Pribilof basin is a half graben that is about 30-miles wide, trends northwest-southeast for about 70 miles, and contains as much as 20,000 feet of Cenozoic sedimentary rocks (Scholl and Hopkins, 1969). It lies between St. George Island and the continental slope west of Pribilof Canyon. The area has never been offered for leasing and no wells have been drilled there. Potential traps include anticlines in the acoustic basement with drape in overlying strata, upthrown fault traps over tilted basement blocks, and stratigraphic onlap.

There are no reservoir-rock or source-rock data for the Pribilof basin. However, seismic data suggest that the basal strata were deposited when the surrounding area was emergent (Comer and others, 1987). Therefore, restricted circulation in the early Tertiary may have been conducive to organic preservation, and strata with good source-rock potential may have been deposited. The oil window probably occurs at about 12,000 feet, so the basal strata should be thermally mature.

OIL AND GAS ENDOWMENTS OF ST. GEORGE BASIN PLAYS
Risked, Undiscovered, Conventionally Recoverable Oil and Gas

PLAY NO.	PLAY NAME (UAI * CODE)	OIL (BBO)			GAS (TCFG)		
		F95	MEAN	F05	F95	MEAN	F05
1.	St. George Graben (UASG0101)	0.000	0.059	0.155	0.000	1.007	2.743
2.	South Platform (UASG0201)	0.000	0.034	0.152	0.000	0.898	4.325
3.	North Platform (UASG0301)	0.000	0.025	0.101	0.000	0.676	2.674
4.	Pribilof Basin (UASG0401)	0.000	0.017	0.070	0.000	0.414	1.502
	FASPAG AGGREGATION	***0.000***	***0.135***	***0.414***	***0.000***	***2.995***	***9.716***

* *Unique Assessment Identifier, code unique to play.*

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